311 241 421 denied this. My information however on the actual topographical arrangement of individual holdings is definitely unsatisfactory. From the evidence it would appear that each working group of commoners must hold in separate plots at least the following:- one patch of vegetable garden, one patch of tobacco cultivation, one patch of wheat and one patch of fallow. But my informants never formulated the position to me in this manner. The problem is linked up with the question of inheritance concerning which my first hand evidence is very slight. As I have shown, it appears that so far as land is concerned the injunctions of the Koran have scarcely even a nominal relevance. Granted however that the Agha as landlord has a nominal right to determine absolutely the inheritance of land tenure among his tenants, it is still far from clear how this works out in practice.

Rice

243 622 The rice cultivation seems usually to be the personal property of the Agha - this being true at least for Walash, Nayat and Dergala. I did not discover what particular individuals are conscripted to work this cultivation or how they are recompensed. It is extremely hard to understand why in a village such as Walash this cultivation is not turned over to tobacco. Sheikh Mohammad actually complained to me that one of the reasons he was so badly off compared with his enemy the Mir of Dergala was that the latter owing to better water supplies was also to grow so much more tobacco. Possible political reasons for this conservatism have been suggested in a previous section; another reason is psychological - from the Kurdish point of view it just is not sense to go short of food and rely on the proceeds of a cash crop to make up deficiencies. In this perhaps the Aghas show remarkable intuitive foresight.

The Mill

256 • 402 An institution which I have so far neglected but which is of more than merely technological significance is the mill. There is a mill associated with nearly all the larger villages. There are mills at Dergala, Nayat and Merga. Walash has none but there is one at Naupurdan. All are worked on the same principle which technologically speaking is very advanced. As may be seen from the diagram and photographs the machine is worked as a horizontal turbine and thus uses the 'velocity' head of the water instead of the weight as in the more usual types of water wheel. This has various technical advantages - for instance it disposes of the necessity for any gearing - and if the apparatus were 'precision made' there is no reason why it should not be highly efficient. Actually the crudity of the workmanship makes it impossible to work the machine at any great speed and the output is limited to about ½ ton of flour in 24 hours, working continuously. The operation of the machine is quite automatic and once started it requires only the minimum of attention.

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Where possible the driving water is obtained by diverting some main stream. This is done at Nampurdan, Rayat and Merga and the operation of the mill then has no effect upon the irrigation system of the village. In Dergala however water supplies are less adequate. If the stream is diverted through the irrigation channels there is insufficient to drive the mill. A compromise has therefore been reached. The water is passed through the cultivation on average six hours per day and to the mill for the remaining eighteen. Some friction arises on this account and while I was in Dergala a young man got a good kicking from the Agha for cutting the dyke during the night so as to get an extra supply of water for his tobacco seedlings. Here again then is an obstacle that might prove confusing to any hastily thought out scheme of agricultural reform.

The owner of the mill is probably in most cases a near relative of the Agha. In Nampurdan it is the Agha himself, in Dergala a father-in-law of the Agha. The terms are in effect that the owner of the wheat hires the mill at a fixed charge for each sack of corn ground. The man who owns the wheat himself operates the machinery. There is no suggestion of selling the corn to the miller. The millowner merely obtains a rental for the use of his apparatus. In this he is in competition with up-to-date apparatus in the towns, the latter being of course much quicker and producing a smoother and cleaner flour. In general however the trouble involved in carrying the wheat to Rowandus and bringing the flour back again is sufficient to ensure that the business remains with the local mill provided the price charged is not too high. In outlying districts at any rate then the mill seems likely to remain a permanent institution.

Weaving

*The only other piece of technical equipment I intend to discuss in this study is the cloth loom. The design of the apparatus is indicated in the diagram. It is nearly identical to the loom used elsewhere in Iraq, with the difference that the latter has the "beater in" suspended from a rigid rectangular framework instead of freely hung from the roof as in the Kurdish example. This improvement permits the widening of the warp. Thus while the Kurdish loom has a maximum warp of about 10½ inches, an apparatus which I saw in Baghdad could carry a warp nearly three times as wide. Kurdish weavers do not apparently ever attempt complicated patterns, they always use a plain weave. Stripes are sometimes introduced by means of coloured threads in the warp. Qualities of cloth produced differ mainly in the thickness and density of the threads. Thus from specimens in my possession, the coarse brown cloth, normally used for the trouserings of commoners, has Warp 19; Weft 22 threads

*The rug loom is quite a different piece of apparatus; it is not considered here since its social relevance seems insignificant.

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402 per inch; while a good quality coloured cloth such as worn by Aghas has
286 Warp 44; Weft 28 threads per inch.

As mentioned already the village weaver, where there is one, now
462 has to face serious competition not only from the cloth dealers of the
178 town but also from certain large scale weaving concerns in Rowandus and
286 Erbil. The latter still use the ordinary Kurdish looms but seem to be able to produce a better quality product than the village craftsman. The difference may be due to the fact that the town craftsman uses a mechanically spun thread, whereas the village weaver in the main works with a hand spun article. But there is no definite tradition that the town made material is superior. The clothes worn by the Mir while I was in Dergala had been made from local cloth, his son Jelal, on the other hand, had purchased the stuff for his new blue trousers in Rowandus. My impression is however that with the ever increasing facilities for contact with traders from the town the functions of the village weaver will soon become superfluous and the community will become completely dependent upon outside sources in yet one further respect.

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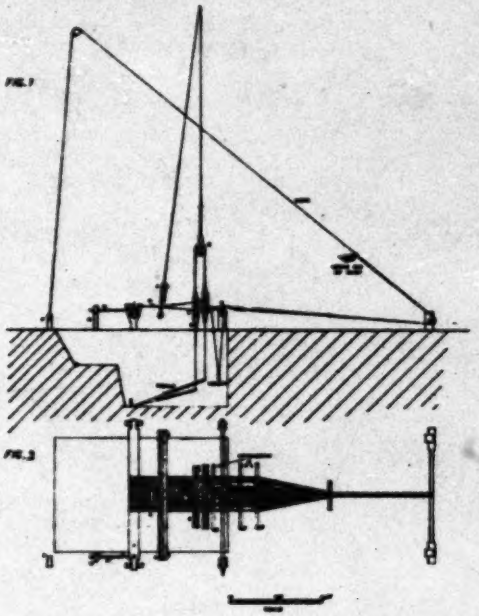

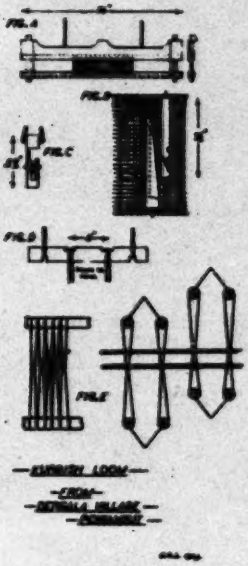

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The Kurdish Loom

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The Kurdish Loom illustrated on the opposite page has not, so far as I can discover, been described in detail before. *Ling Roth mentions the Hindu Pit Treadle Loom as a variation of the Horizontal Narrow Band Treadle Loom but does not describe it. The Kurdish Pit Treadle Loom, here shown, is similar to that used in Central Mesopotamia except that the latter has the sley slung from a rigid rectangular framework thus allowing of a wider warp.

Taken in conjunction with the photographs (unfortunately blurred owing to overexposure) the diagrams opposite should be more or less self explanatory.

The weaver sits in a pit beneath the loom. He operates the heddle mechanism with his feet by means of a treadle and works the shuttle and sley with his hands.

Fig. 1 is a section through the loom and Fig. 2 is the corresponding plan. Portions of the apparatus marked A.B.C.D.E. in small letters are shown in larger scale in the subsidiary figures to the right of the diagram. The scales for figures A.B.C.D. are as indicated; Fig.E is diagrammatic only.

Fig.A shows the sley (reed, beater in). As can be seen it can be readily taken to pieces. The comb of the reed is not rigidly attached to the batten frame but runs freely in grooved slots indicated by the dotted lines. This prevents the warp being 'dragged' on one side if the weaver fails to pull the sley quite straight.

The woof (weft) on the finished cloth immediately behind the shed is kept taut by the device shown in Fig.B. I am unaware of the English technical term for this device. It can be seen in position in one of the photographs. It consists of two pieces of wood, each with a steel needle at one end, joined together with string at the other. By adjusting the length of the string the two pieces can be made to form a rigid bar of variable length. The diagram shows the pieces in position on the cloth before looking one inside the other.

Fig.C shows one of the two pulley blocks supporting the heddle rocker.

Fig.D shows one of the bars from which the pedal straps are suspended; it appears in cross section in figure 1 at the point D.

Fig.E shows (diagrammatically) the way the warp threads are threaded through the leashes of the heddle. Note from figure 1 that both heddle and counter-heddle are double, the odd threads passing through both sets of leashes on one side of the rocker and the even threads through those of the other. I did not obtain precise details of how the leash strings are knotted and looped.

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The finished cloth is rolled on the square sectioned breast beam (J). This is held in position by the rod H which fits into one of four holes in the sides of J and is hooked under the fixed ground peg F. To adjust the warp the rope is freed at F, and H and J can then be adjusted at will. It should be noted that for convenience F.G.H. have been shown in Fig.1 as well as in Fig.2 though they are positioned on the weavers right hand side as indicated in the plan. 402 • 286

There are three spreaders (lase rods), the front one of which is in front of the raddle beam K. This last is held down by the weight shown in figure 1; this prevents the spreader slipping forward into the heddle mechanism and prevents the warp 'bouncing' on K. Without this device the rear spreaders would require constant adjustment.

The raddle beam K is slightly grooved on the top face so as to keep the threads in place; it serves the same function as the spreaders - that of keeping the warp threads taut and spread out. Its occurrence is unusual in primitive loom designs.

[p 68 is blank]

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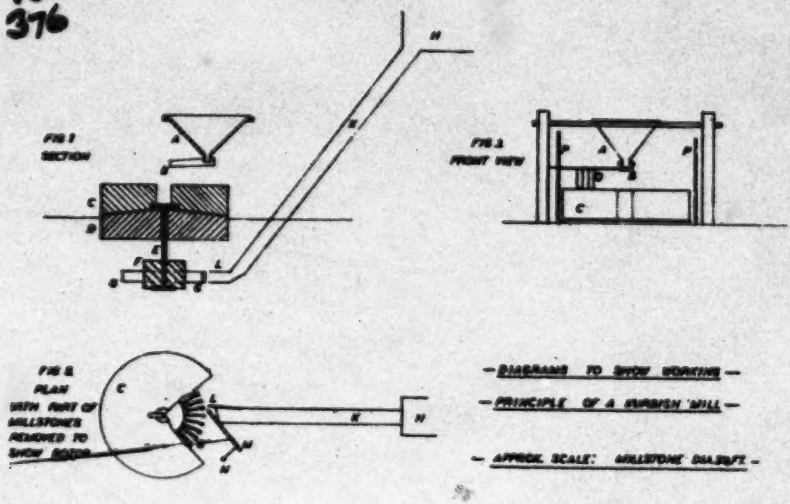

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The Kurdish Water Mill - Hill Country, Turbine Type

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The diagrams opposite should be read in conjunction with the photographs at the end. The type of mill illustrated is found all over the Rowanduz area (Map 1. Area A) and probably has a wide distribution, it is not found however in the plains districts where an entirely different type of water wheel is in use. I have so far failed to trace a description of any similar mill elsewhere.

The operation of the mill is very simple though I know of no other example of primitive mechanism employing this turbine principle.

Water is supplied from a channel H and falls down a steep shoot or feed pipe K. This is sometimes totally enclosed but more usually takes the form of a deep sided channel. The total head of water obtained by this means is about 20 feet. At the bottom of the feed pipe the water passes through a horizontal jet L, the aperture of which can be adjusted by a mechanism MM operated from the floor of the mill-house. From the jet the water plays onto a turbine rotor of wooden blades G set in a heavy stone boss F. These blades are set slightly on the skew and have a portion of the upper face cut away to provide a cup. The extent of the skew can be judged from photograph No.13 where a spare rotor block can be seen on the left of the picture. There is no bottom bearing and the whole rotor mechanism hangs freely from above, supported only by the steel shafting E. This latter passes through a hole in the lower millstone D_1 (which is fixed rigid in the surrounding masonry) and is slotted into the upper rotating millstone C. I did not see the apparatus dismantled so I am uncertain as to the precise method of keying the shafting into the rotor stones F and C or of the form of the bearing where the upper end of the shafting spins on the fixed stone D. The corn feed mechanism is best understood from the photograph. The corn passes from the bin A, into the dripfeed B. The dripfeed is attached to the device Q which is joggled by the rotation of the mill-stone. This causes the feed B to vibrate and drop the corn grains into the central hole of the millstone. The rate of feed is adjusted by varying the incline of the feed B. The screen P is erected round the back and sides of the millstone so as to prevent the flour flying out in all directions.

The following additional explanation refers to the diagrams only. In Fig.1 the structure supporting the corn bin and the screen P and also the mechanism for adjusting and vibrating the feed B are omitted. It should be understood that the lower stone D is set rigid in the ground, while the rotor mechanism FG hangs freely in a cavernous space under-ground. In Fig.3 the rotor and jet setting is oversimplified, and the skew setting of the rotor blades ignored. The jet L is actually slightly above the rotor blades and the direction of the water flow slightly downwards. The blades are thus struck in the centre at an incline of about 30 degrees rather than at the ends horizontally as the diagrams would seem to indicate. In actual operation the machine works remarkably smoothly at slow speeds, but as might be expected a violent vibration devlops if any attempt is made to drive the apparatus hard.

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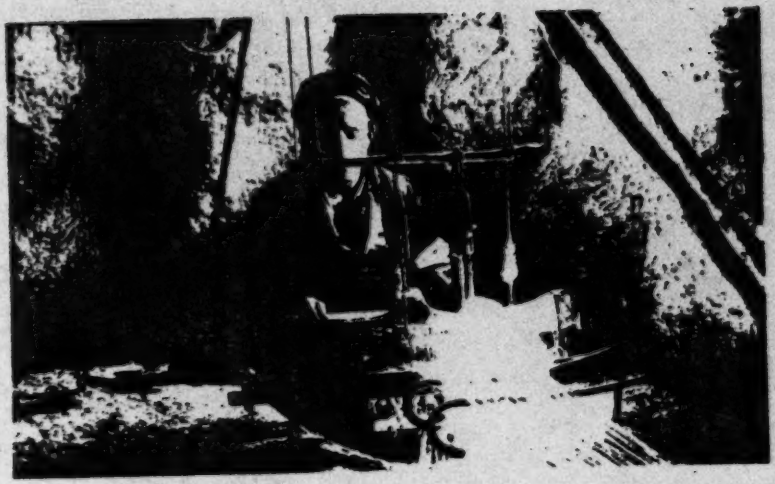

Plate 13.
Loom. (For comparison with diagrams.)

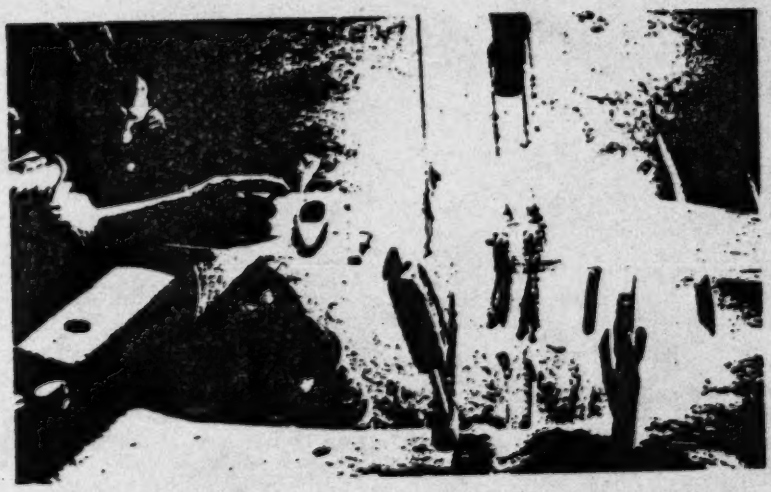

Plate 14.
Loom. (For comparison with diagrams.)

[Opposite page 74 - G]

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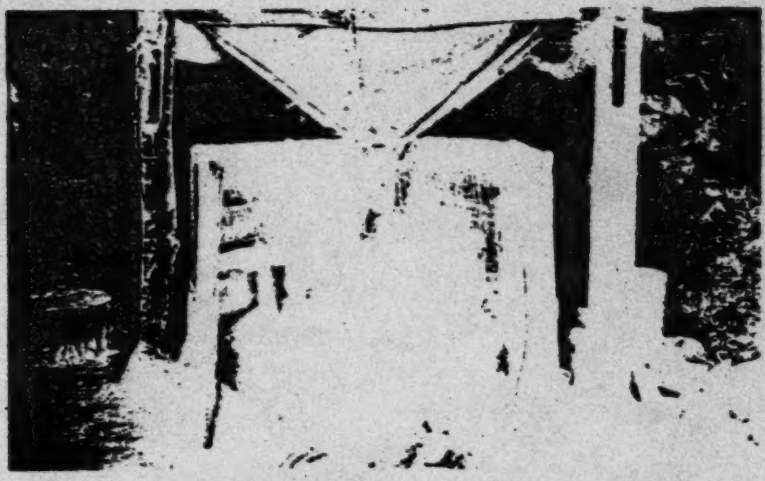

Plate 15.
Turbine Water Mill. (For comparison with diagrams; especially Fig. 2.)

Plate 16.
Turbine Water Mill. Rotor blades.

[Opposite page 74 - H.]